

# Comparison of thermal and chemical freeze-out conditions in 159 GeV/A Pb-Pb collisions

Giorgio Torrieri Johann Rafelski Jean Letessier

*Department of Physics, University of Arizona, TUCSON 85721*

<sup>b</sup>*Department of Physics, University of Arizona, TUCSON 85721*

<sup>c</sup>*LPTHE, Université Paris 7, 2 place Jussieu, F-75251 Cedex 05*

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*Presented by: G. Torrieri*

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## Abstract

We study  $m_{\perp}$  shape of hadron spectra. In our approach we allow transverse flow and freeze-out surface velocity to be different, and for high  $m_{\perp}$  pions we also allow direct parton-parton scattering contributions. We model the transverse momentum distributions of hadrons and find a set of fireball parameters which describe with high statistical significance the transverse momentum distributions of hyperons, antihyperons, kaons and pions produced in 158 GeV Pb-Pb collisions. We compare these parameters to those describing chemical freeze-out and determined using hadron abundances. The results are used to distinguish between the sudden hadronization scenario, in which chemical and thermal freeze-out conditions coincide and no further interactions occur after hadron production, and a staged freeze-out, in which hadrons may be produced at different fireball conditions and/or be subject to interactions after chemical freezeout. Our results are consistent with the proposed sudden breakup of a  $T = 143 \pm 3$  MeV supercooled QGP fireball.

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